



MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.

24590-PTF-MV-CNP-VSL-00004

R10486410

Project:	RPP-WTP	P&ID:	24590-PTF-M6-CNP-P0002/24590-PTF-M6-CNP-P0004/24590-PTF-M6-CXP-P0007
Project No:	24590	Process Calculation	Deleted ²
Project Site:	Hanford	Vessel Drawing	24590-PTF-MV-CNP-P0002
Description:	Cs Evaporator Recovered Nitric Acid Vessel		

ISSUED BY
RPP-WTP PDC

Reference Data

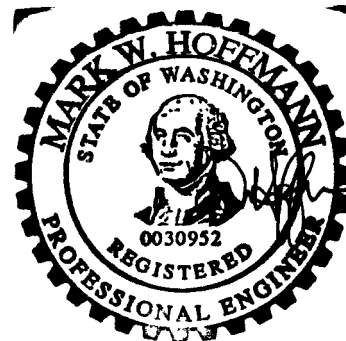
Charge Vessels (Tag Numbers)	CNP-VSL-00162
Pulsejet Mixers / Agitators (Tag Numbers)	4 (CNP-PJM-00019, CNP-PJM-00020, CNP-PJM-00021, CNP-PJM-00022)
RFDs/Pumps (Tag Numbers)	CNP-RFD-00005

Design Data

Quality Level	CM	Fabrication Specs	24590-WTP-3PS-MV00-TP001		
Seismic Category	SC-III	Design Code	ASME VIII Div 1		
Service/Contents	Recovered Nitric Acid	Code Stamp	Yes		
Design Specific Gravity	1.07	NB Registration	Yes		
Maximum Operating Volume	gal	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	Estimated	29,365	121,375	123,200
		Actual *			

Inside Diameter	inch	114	Wind Design	Not Required	
Length/Height (TL-TL)	inch	228	Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design
					24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-FB01-T0001
Internal Pressure	psig	0 (Note 8)	15	Seismic Base Moment *	ft ² lb
External Pressure	psig	0.22	FV	Postweld Heat Treat	Not Required
Temperature	°F	115-140	255 (Note 7)	Corrosion Allowance	Inch 0.04
Min. Design Metal Temp.	°F	40		Hydrostatic Test Pressure *	psig

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.



1/26/05

EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

2	2/17/05 4/26/05	Issued for Permitting Use				
1	6/26/04	Issued for Permitting Use	K. Brightman	H. Khurana	C. Slater	M. Hoffmann
0	12/17/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	M. Hoffmann
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Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 304 Note 1	See Drawing	Auxiliary (See note 5)
Shell	SA 240 304 Note 1	See Drawing	Primary (See note 5)
Bottom Head	SA 240 304 Note 1	See Drawing	Primary (See note 5)
Support	SA 240 304 Note 1	See Drawing	NIA
Jacket/Coils/Half-Pipe Jacket	NIA	NIA	NIA
Internals	SA 240 304 Note 1	See Drawing	Thermowells Primary
Pipe Nozzles	SA 312 TP304 Note 1	See Drawing	Primary (See note 5)
Forgings/ Bar stock	SA 182 F304 Note 1	See Drawing	NIA
Gaskets	NIA	NIA	NIA
Bolting	NIA	NIA	NIA

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	NIA	Insulation Material	NIA
Insulation Thickness (inch)	NIA	Internal Finish	Note 3
		External Finish	Note 3

Remarks

• To be determined by the vendor.

Note 1: Max. Carbon Content 0.030%.

Note 2: Deleted

Note 3: Welds descaled as laid.

Note 4: This vessel is in a Black Cell.

Note 5: All welds forming part of the Primary and Auxiliary Containment including nozzle attachment welds shall be subjected to 100% volumetric examination

Note 6: Contents of this document are Dangerous Waste Permit affecting.

Note 7: Max. design temperature kept equal to that of CNP-VSL-00003

Note 8: 0 psig is the maximum internal vessel operating pressure. The internal vessel operating pressure will range from -0.22 psig to 0 psig.

Note 9: Deleted ²

Note 10: All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. ²



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Equipment Cyclic Data Sheet

Component Plant Item Number:	CNP-VSL-00004
Component Description	Parent Vessel

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	SA 240 304 with max. carbon of 0.030 %
Design Life	40 Years
Component Function and Life Cycle Description	The purpose of the Cs Evaporator Recovered Nitric Acid Vessel is to receive eluant (0.5M nitric acid) from the Cs Evaporator Nitric Acid Rectifier and serve as a feed vessel to the Cs Ion Exchange Columns. Filling cycle is based on a 48 hour (every 33 hours for a 15 hour period) elution cycle over 40 years.

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	15	10	Nominal assumption for Testing
Operating Pressure	psig	-0.22	0	NIA	The vessel will remain under constant pressure depending upon the plant HVAC
Operating Temperature	°F	115	140	NIA	Uniform material temperature range, not between two points.
Contents Specific Gravity		1.00	1.1	NIA	Normally 1.02 without cycling.
Contents Level	inch	40	235	7,300	Based on a 48 hr elution cycle over 40 years
Localized Features					
Nozzles					
Supports					

Notes

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.**



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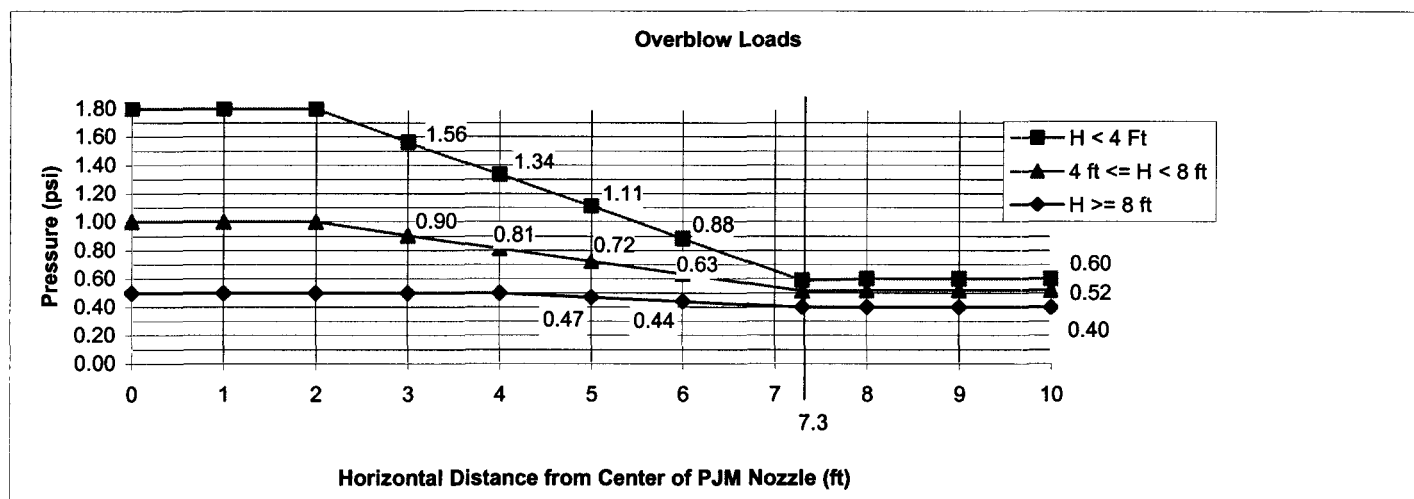
Hydrodynamic Loading ²

In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overflow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overflow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

Hydrodynamic loads acting on a surface vary with the location of the surface within the vessel. The following table indicates the normal hydrodynamic pressure ranges and the number of design cycles. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Condition	Hydrodynamic Pressure Range, psi				Number of Cycles
	Between PJM Center and Vessel Wall		Between Vessel Center and PJM Center		
	Radial	Vertical	Radial	Vertical	
Normal Operation	-0.80 to 0.80	-0.80 to 0.40	-0.20 to 0.30	-0.20 to 0.25	7.5 x 10 ⁶

Overflow loads vary as a function of the horizontal distance from the center of the overflowing pulse jet mixer nozzle and the elevation 'H' above the overflowing pulse jet mixer nozzle up to the overflow level as plotted:



The overflow pressure shall only be applied to the projected area of the overflowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overflowing pulse jet mixer. Any single pulse jet mixer may overflow 100 cycles. ²

Notes

- Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. ²



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PLANT ITEM No.

24590-PTF-MV-CNP-VSL-00004

Equipment Cyclic Data Sheet

Component Plant Item Number:	CNP-VSL-00162 and CNP-RFD-00005
Component Description	Charge Vessel Type 'C'(Sampling) & RFD Model 125M

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	SA 240 304 with max. carbon of 0.030 %
Design Life	40 Years
Component Function and Life Cycle Description	The charge vessel is cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessel is contained within a parent vessel with varying liquid level. It shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	80	10	Nominal assumption for Testing
Operating Pressure	psig	FV	72.5	2,400**	
Operating Temperature	°F	115	140	N/A	Uniform Temperature range, not between two points
Contents Specific Gravity		1.00	1.1	N/A	Normally 1.02 without cycling.
Contents Level	inch	Empty	Flooded	2,400**	
Localized Features					
Nozzles					
Supports		Buoyant/ Loaded		2,400**	

Notes

- **Cycle increase:** The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- ****Based on 40 year life expectancy.** Sampling takes place 12 times/year (Analytical Laboratory Design Requirements: WTP Sampling and Analysis Plan 24590-WTP-PL-PR-01-004 Rev. 2, pg. C-6). To obtain an accurate sample, we assume that each sampling averages 5 attempts.



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Equipment Cyclic Data Sheet

Component Plant Item Number:	CNP-PJM-00019, CNP-PJM-00020, CNP-PJM-00021, CNP-PJM-00022
Component Description	Pulse Jet Mixers (PJM Type A)

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	SA240 304 with 0.030 max. carbon
Design Life	40 Years
Component Function and Life Cycle Description	These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles. 

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	80	10	Nominal assumption for testing
Operating Pressure	psig	FV	72.5	7.5×10^4	Based on 40 year life expectancy
Operating Temperature	°F	115	140	N/A	Uniform temperature range, not between two points
Contents Specific Gravity		1.00	1.1	N/A	Normally 1.02 without cycling.
Contents Level	inch	Empty	Flooded	7.5×10^5	
Thrust 	lbf	0	262	7.5×10^5	
Localized Features					
Nozzles					
Supports		Buoyant/ Loaded		7.5×10^5	

Notes

- **Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.**